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REVIEW OF WHOLESALE ELECTRIC MARKET DESIGN	**§** **§**	**PUBLIC UTILITY COMMISSION OF TEXAS**

RESPONSE OF L. LYNNE KIESLING TO COMMISSION STAFF'S REQUEST FOR COMMENT ON WHOLESALE MARKET DESIGN

Introduction

Lynne Kiesling is an economist focusing on regulation, market design, and the economics of digitization and smart grid technologies in the electricity industry. She is a Research Professor in the School of Engineering, Design and Computing at the University of Colorado-Denver, and Co-Director of the Institute for Regulatory Law & Economics; she is also an Adjunct Professor in the Masters of Science in Energy and Sustainability program at Northwestern University. Her publications include *Electricity Restructuring: The Texas Experience*[1] (co-edited with Andrew Kleit) and *Deregulation, Innovation, and Market Liberalization: Electricity Restructuring in a Constantly Evolving Environment*.[2] She has served as a member of the National Institute of Standards and Technology's Smart Grid Advisory Committee and is an emerita member of the GridWise Architecture Council. Her academic background includes a B.S. in Economics from Miami University (Ohio) and a Ph.D. in Economics from Northwestern University.

The Institute for Regulatory Law & Economics provides a means of supporting and developing thoughtful regulatory decision-making in network industries facing dynamic technological change. The IRLE strives to bring a clear theoretical framework in law and economics and a grounding in technology fundamentals to actual regulatory practice. These comments are in my individual capacity and do not reflect the views of the IRLE, other IRLE faculty, or the University of Colorado-Denver.

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[1] L. Lynne Kiesling and Andrew Kleit, eds., *Electricity Restructuring: The Texas Experience*. Washington, DC: AEI Press, 2009.

[2] L. Lynne Kiesling, *Deregulation, Innovation, and Market Liberalization: Electricity Restructuring in a Constantly Evolving Environment. London: Routledge, 2008.*

Executive Summary

Revising ERCOT's market design presents an opportunity to take advantage of advances in digital and distributed energy resource technologies to incorporate smaller and more heterogeneous supply *and* demand resources into markets. It is also an opportunity to improve the communication of meaningful price signals throughout the wholesale/retail system by revising the Value of Lost Load provisions in the ORDC. Through lower entry barriers and more widespread and more automated participation of diverse DER, ERCOT market rules can align individual producer/consumer incentives and system reliability and resilience incentives.

General Comments

The ERCOT markets are the most robust in the world, and have promoted efficiency, cost reduction, and innovation. When approaching these market design questions, I suggest that the Commission bear in mind that "… success in Texas was due to three factors: a competitive vision and the political leadership to carry it through, an institutional design that focused on transparent rules that enabled decentralized coordination, and ongoing regulatory analysis of market outcomes and willingness to use those analyses to revise market rules to facilitate competition."[3] The current effort provides an example of the third success factor.

As the Commission considers modifications to ERCOT's market design with an objective of improving year-round reliability, the institutional design challenge is retaining the features that have harnessed the competitive market benefits while also ensuring that those markets enable power system reliability. Moreover, the forward-looking market design questions include not just reliability, but also resilience, the ability of the integrated cyber-physical-social system to withstand an adverse event and return to a base operating condition after an adverse event. When considering design principles, our increasing focus on system resilience increases the priority of *flexibility*, the ability of the system and its components to adapt to unknown and changing conditions.

Several contributing factors to the February outages are outside the scope of ERCOT market design, such as

[3] L. Lynne Kiesling and Andrew Kleit, eds., *Electricity Restructuring: The Texas Experience*. Washington, DC: AEI Press, 2009, p. 1.

- Issues surrounding the failure of upstream natural gas supply to generators,
- The overly-large distribution grid sectionalization that led to disparate effects of rolling outages, and
- The lack of building energy efficiency, particularly in lower-income residential housing stock.

Modifications of ERCOT's market design do not eliminate the importance of policy action on those factors.

Within the scope of ERCOT's market design, a fundamental design principle is to coordinate supply and demand through markets, which are processes of decentralized coordination. If participation rules are transparent, it will be easier and less costly for both supply and demand resources to participate when they see a benefit from participating. More widespread participation from more diverse resource owner/operators, in both supply *and* demand, will provide the responsiveness necessary for reliability and the flexibility necessary for resilience. A design focus on supply alone will not meet the ultimate objectives of both reliability and resilience.

In the decade since the initial AMI rollout, digital technologies and software systems have improved considerably, and diverse behind-the-meter distributed energy resources (DER) have come into the home energy market. New IEEE standards (such as IEEE 1547 for smart inverters) reduce the interconnection challenges of DER while also reducing the transaction costs to their owners of participating in both energy markets and markets for a variety of ancillary services. Consumers and their digitally-enabled and automated devices can, in aggregate, provide considerable response for reliability and flexibility for resilience, and the beneficial retail market design in the ERCOT territory creates opportunities for REPs to develop contracts that align consumer response incentives with system reliability, system resilience, and REP profit. That alignment is one of the fundamental design principles for a robust market design. Consider, for example, if during an EEA situation residential customers with digital thermostats could reduce their thermostats to 62 degrees and be compensated accordingly (as too should the REP enabling that responsiveness, to align the incentivers). Would that compensated discomfort for some have eliminated the need for rolling outages and the human and physical costs that ensued? Digitization and the existing retail market provisions make this scenario possible, and should be incorporated into any evolution of ERCOT's market design.

Responses to Questions

1. What specific changes, if any, should be made to the Operating Reserve Demand Curve (ORDC) to drive investment in existing and new dispatchable generation? Please consider ORDC applying only to generators who commit in the day-ahead market (DAM). Should that amount of ORDC - based dispatchability be adjusted to specific seasonal reliability needs?

Within the supply-focused design elements, the most valuable change to explore is to reconsider the administrative estimate of Value of Lost Load (VOLL). The VOLL is an administrative calculation intended to fill the gap left by passive demand, and the specific $9000 estimate used is a single, static estimate of an underlying marginal benefit that varies across individuals, across time, and across system status. This static estimate does not provide the main benefit that prices provide to such a complex system: prices provide a way to access and aggregate the private knowledge of preferences and opportunity costs that is distributed throughout the system, and is only known to each individual.

"Neither the concept or calculation of the ORDC curve nor the associated $9,000 system-wide offer cap reflect a sense of dynamic market process, of knowledge discovery. In principle the calculation is based on a static neoclassical welfare economic equilibrium rather than on any concept of competitive process. In practice the focus has been on the marginal cost of a natural gas-fired peaker generation plant rather than on any value to customers, and "the VOLL was set at $9,000 because that was where the offer cap was going to be set by 2015 under the PUCT's prior order" (Baldick et. al. 2021, p. 50). In reality, VOLL varies by customer and over time, and the uniform administered VOLL used is at best a rough approximation in the absence of an active demand side."[4]

Recommendation: Modifying ERCOT participation rules to make demand resource participation easier and with lower transaction costs would reduce the need for such a static estimate.

Recommendation: Revising the calculation of VOLL so that it is more dynamic and reflects variations in marginal benefit across individuals, time, and system status.

2. Should ERCOT require all generation resources to offer a minimum commitment in the day-ahead market as a precondition for participating in the energy market? a. If so, how should that minimum commitment be determined? b. How should that commitment be enforced?

ERCOT should not require supply-side minimum commitments. Such a requirement would create an entry barrier for smaller resources, including DER, that could offer their supply precisely in times when at the margin their supply would be crucial for reliability and/or resilience. Moreover, day-ahead markets are not the issue with respect to how market participation affects reliability and resilience. The top priority issue is enabling more, and more flexible, participation from the increasingly diverse supply resources available in the ERCOT system.

Recommendation: Rather than minimum supply commitments in the day-ahead market, focus on designing rules that reduce barriers to entry and participation for both sellers and buyers,

[4] Stephen Littlechild and L. Lynne Kiesling, "Hayek and the Texas Blackout," *Electricity Journal* 34 (2021), p. 4.

supply and demand, in nearer-time (1 hour, 15 minute) energy markets and in ancillary services, including frequency response.

3. What new ancillary service products or reliability services or changes to existing ancillary service products or reliability services should be developed or made to ensure reliability under a variety of extreme conditions? Please articulate specific standards of reliability along with any suggested AS products. How should the costs of these new ancillary services be allocated.

Digitization makes it possible for small and flexible DER (such as storage and electric vehicles) to participate in ancillary service markets. While such ancillary service market designs and the interfaces that enable DER to submit bids and offers may not be immediately available, any current revisions to ERCOT's market design should not preclude such granular future ancillary service markets. Indeed, part of the transition to FERC 2222 should include enabling ERCOT market design to accommodate participation from such resources.

Recommendation: ERCOT market design should enable small DER to participate in ancillary service markets. Rules for allocation of the costs of paying for ancillary services should be technology neutral and treat all resources uniformly.

4. Is available residential demand response adequately captured by existing retail electric provider (REP) programs? Do opportunities exist for enhanced residential load response?

Residential demand response is an extremely underutilized resource, and existing ERCOT rules prevent residential resource market participation. This exclusion from energy and ancillary service markets reduces the incentives that residential consumers could have to invest in digital home energy management and DER technologies, which would increase their responsiveness for reliability and their flexibility for resilience.

Recommendation: ERCOT market design should include rules for residential aggregation and for automated participation in energy and ancillary services markets.

5. How can ERCOT's emergency response service program be modified to provide additional reliability benefits? What changes would need to be made to Commission rules and ERCOT market rules and systems to implement these program changes?

Allowing smaller-scale and residential participation, as described above in my general comments, could reduce the incidence of emergency situations and would enable those resources to respond constructively in emergency situations.

6. How can the current market design be altered (e.g., by implementing new products) to provide tools to improve the ability to manage inertia, voltage support, or frequency?

The relevant design concept is embedded in the response to Question 3, allowing for widespread participation of more heterogeneous and smaller resources, including automated response to price signals and price-based dispatch in both energy and ancillary services markets.

Conclusion

I appreciate the opportunity to offer these comments, and I look forward to working with the Commission, Commission staff, and stakeholders to ensure that ERCOT's market design aligns incentives to create a reliable, resilient, and innovative electric system.

Respectfully submitted,

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